

# (12) UK Patent Application (19) GB (11) 2 375 923 (13) A

(43) Date of A Publication 27.11.2002

(21) Application No 0112732.3

(22) Date of Filing 25.05.2001

(71) Applicant(s)

**Roke Manor Research Limited**  
(Incorporated in the United Kingdom)  
Old Salisbury Lane, ROMSEY, Hampshire,  
SO51 0ZN, United Kingdom

(72) Inventor(s)

**Peter Lockhart**

(74) Agent and/or Address for Service

**Siemens Shared Services Ltd**  
Intellectual Property Department,  
Roke Manor, ROMSEY, Hampshire,  
SO51 0ZN, United Kingdom

(51) INT CL<sup>7</sup>

H04N 7/08 , H04L 12/28

(52) UK CL (Edition T )

H4L LDGX

(56) Documents Cited

WO 1999/000979 A1

WO 1998/017073 A1

US 6037932 A

US 6018768 A

US 5715261 A

US 4807031 A

(58) Field of Search

UK CL (Edition S ) G4F F14, H4F FHT, H4L LDDDX  
LDGR LDGX LDPPX LESF

INT CL<sup>7</sup> G08C 17/02 23/02 23/04 23/06, H04L 12/28,

H04M 3/487, H04N 7/08, H04Q 7/22 7/32 11/04

On-line: WPI, EPODOC, JAPIO

(54) Abstract Title

**Recognising and extracting embedded data in a broadcast signal**

(57) The invention relates to a device (1) for recognising and extracting embedded data, which data is embedded in a broadcasted information transmitted by a broadcaster (7), and for transmitting said extracted data to a home network (4). The device (1) comprises a content aware adapter (2) for recognising and extracting said embedded data and for transmitting said extracted data to a home network (4) and further comprises a connector (3) for providing a communication link between said adapter and a receiver (6). The receiver (6) receives said broadcasted information. The invention further relates to a system and a method for recognising and extracting embedded data, which data is embedded in a broadcasted information transmitted by a broadcaster.

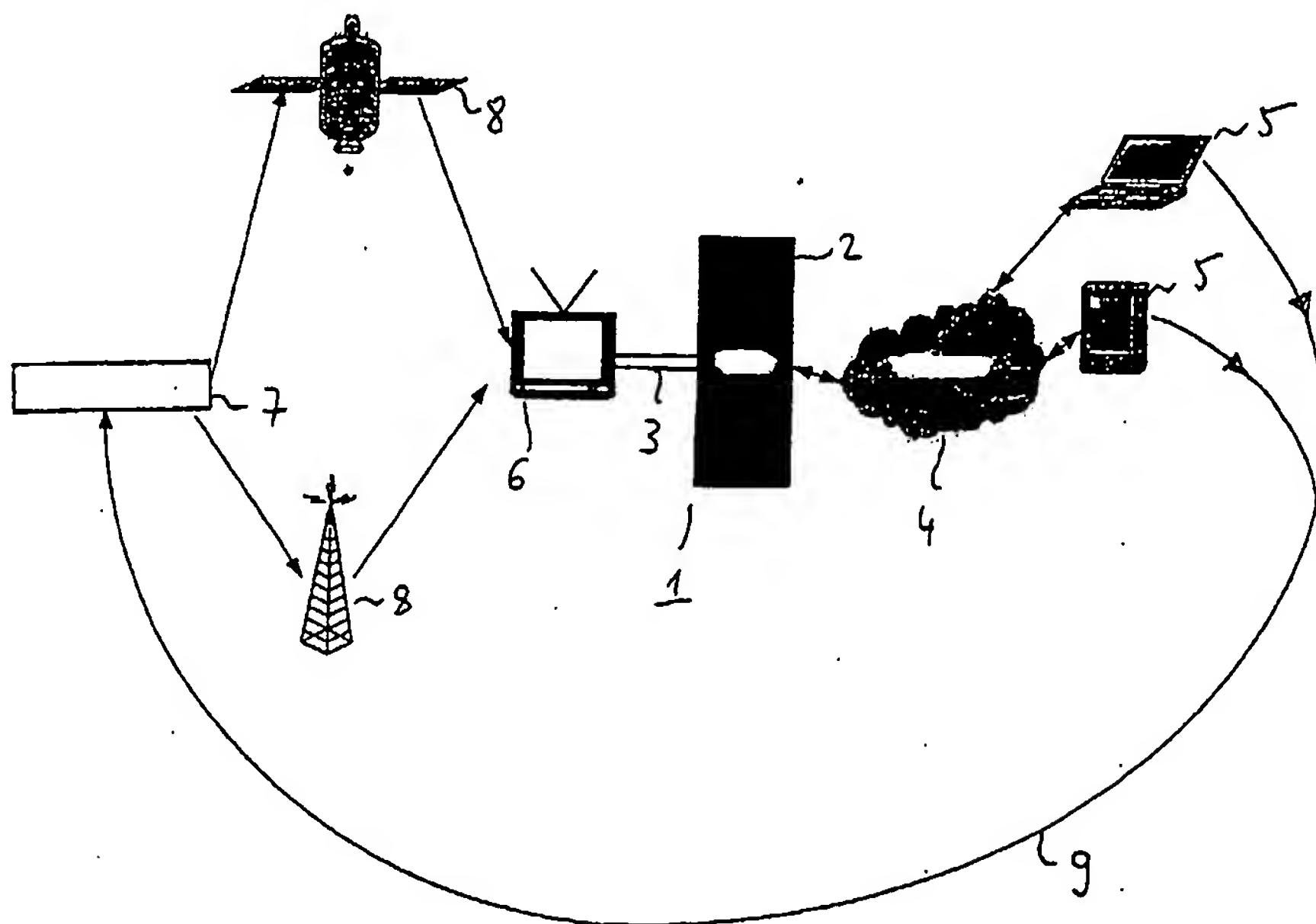


Fig 1

GB 2 375 923 A

BEST AVAILABLE COPY

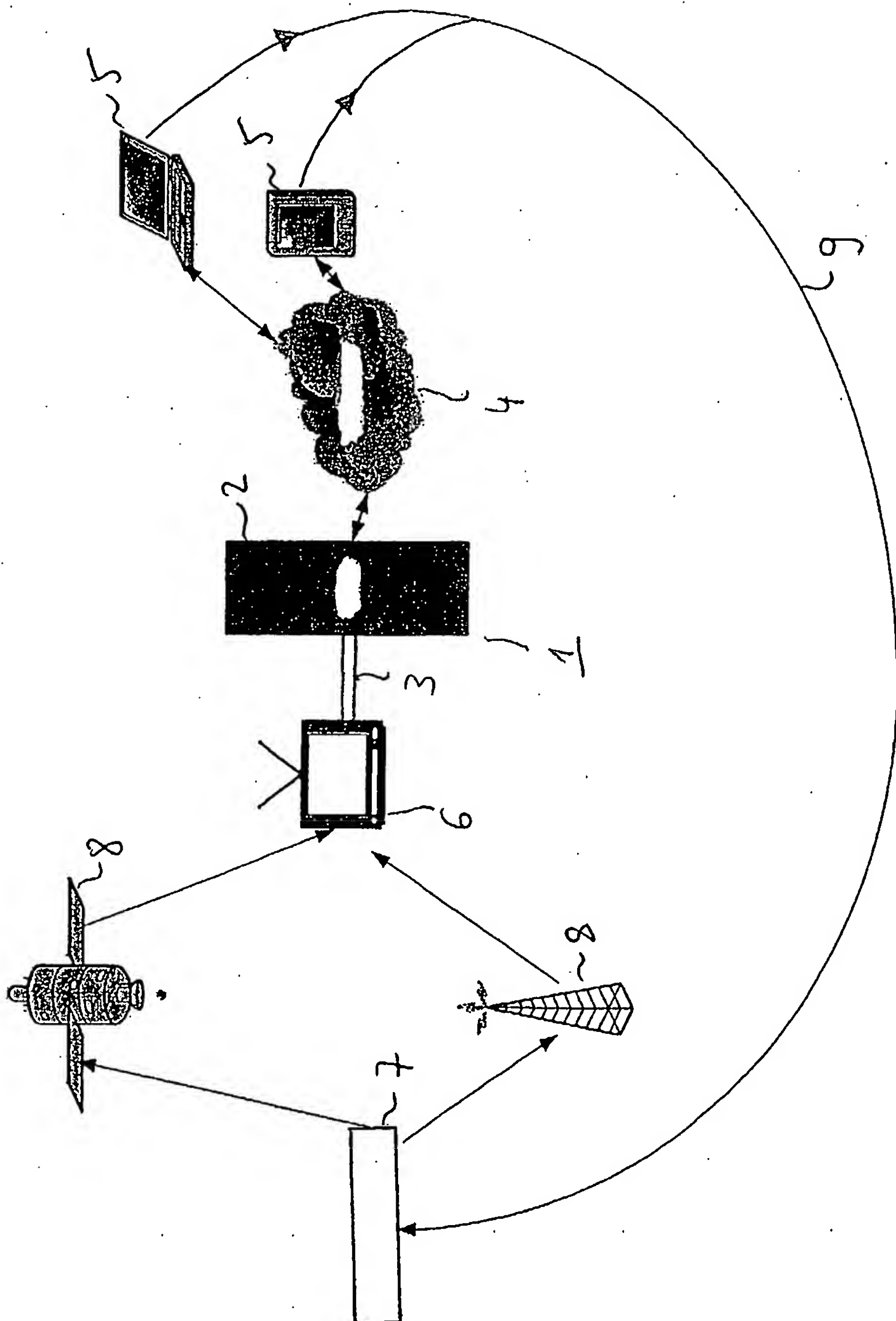


Fig 1

BEST AVAILABLE COPY

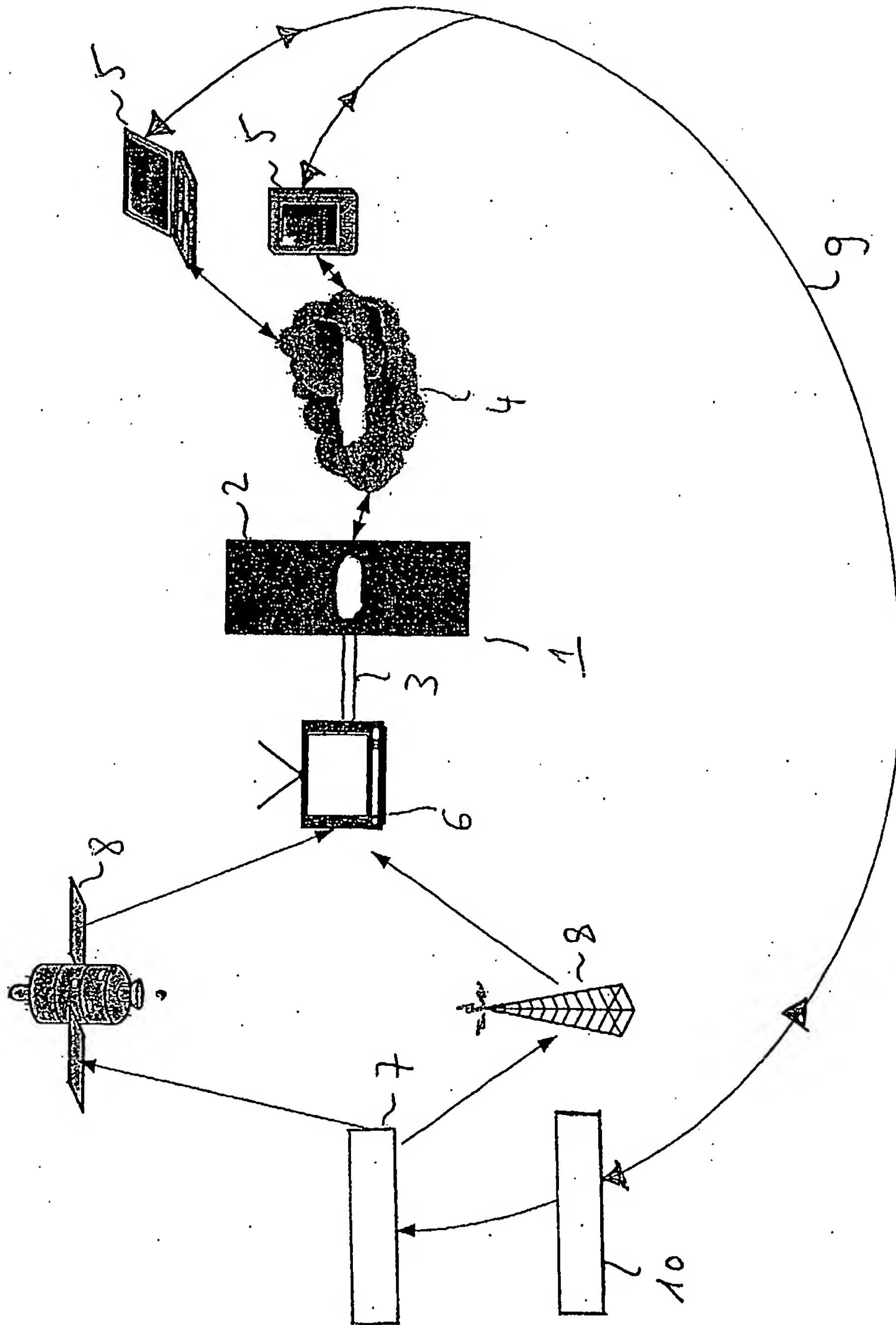


Fig. 2

## DEVICE, SYSTEM AND METHOD FOR RECOGNISING AND EXTRACTING EMBEDDED DATA

### TECHNICAL FIELD

5

The invention relates to a device, a system and a method for recognising and extracting embedded data, which data is embedded in a broadcasted information transmitted by a broadcaster.

10

### BACKGROUND OF THE INVENTION

The transmission of control data via a television receiver for controlling of toys located in a television viewer's home is described in US-Patent 4,807,031 to Broughton et al. The method described in this US-Patent permits the remote control of  
15 interactive devices proximate to a conventional television receiver by the broadcast of composite video information thereto. The method consists of producing a composite video signal containing program material and control data by subliminal luminance and/or chrominance modulation. The signal is broadcasted to and received by a television. Using an interactive video apparatus which takes the form of an optical  
20 transducer including a light sensitive diode, which is attached to the television screen, the modulation of the signal is detected at the television. Another method for decoding the signal includes instead of the optical transducer an antenna capable of intercepting radio frequency (RF) electromagnetic radiation and coupling it to conventional receiver electronics. Instead of the optical signal an inaudible, but  
25 detectable, low RF artefact of the data modulated video subcarrier is produced by the raster scan electronics of a television which is displaying the composite video signal. Detecting this signal emitted through the viewing area of the TV a more limited range for detecting the signal is given. The antenna must be located within some tenth centimetre of, and in front of, the television screen, due to the relatively low energy  
30 level of the RF emanations.

The signal is according to US-Patent 4,807,031 solely provided and detectable within a predefined viewing area of the TV. Although the modulation is within the viewing area of the television screen, it remains substantially invisible to the viewer because of

its relatively low intensity, its timed relation to the horizontal line rate and the inherent integration and resolution characteristics of the human eye.

Receiver electronics reconstruct the control data by detecting the video subcarrier in  
5 the modulated video image and producing a bit-serial signal representing the control data. Transmitter electronics amplitude modulate an infrared (IR) carrier by the reconstructed control data and drive an infrared light emitting diode (IRED) array. Using IR carrier the control data is directly transmitted by IR light to a toy, like a toy car, educational or other devices within the range of the IR transmission to respond to  
10 the program material in a predetermined manner.

The data encoding method mentioned in US-Patent 4,807,031 involves modulating a video signal at frequencies that are related to multiples and submultiples of the horizontal line rate, to produce a subtle video subcarrier. One or more of such  
15 subcarriers may be data modulated to convey information, in serial or parallel, in a variety of ways, like pulse modulation (PM), phase modulation (PM), amplitude modulation (AM), frequency modulation (FM), time or pulse interval modulation (PIM), frequency shift keying (FSK), return-to-zero (RZ), non-return-to-zero (NRZ), or other spatio-temporal modulation and coding techniques.

20 US-Patent 5,200,882 to Bronfin et al. refers to an arrangement for, and a method of, processing proprietary data on the active video component of a television signal and automatically identifying and verifying the airing of television broadcast programs using the technique of line over scan. The data-modulated signal is added to the active  
25 video component of the television signal to form an encoded composite signal on a plurality of lines of the picture. The encoded composite signal is subsequently transmitted to a receiver for displaying the picture on the viewing area. The receiver is a radio frequency antenna , or cable decoder box. A microprocessor receives the horizontal and vertical synchronising signals and outputs a frequency control signal,  
30 as well as data extracted from the composite signal to a computer terminal. Rather than inserting a program identification code in a preselected single scan line in an over-scan region of the receiver, the data is spread over a plurality of the lines of the picture in the line of sight of the viewer. However, the viewer cannot see the data-modulated signal superimposed on the plurality of lines of the picture due to the low

amplitude of the data-modulated signal, as well as its timed relation to the timing component of the television signal.

Other methods for encoding data referring to technology areas different from that of  
5 US-Patent 4,807,031 are known. In US-Patent 5,111,417 it is for example referred to the method of digital echo modulation. In US-Patent 5,912,644 the method of spread spectrum signals in the field of mobile telecommunication is used. In US-Patent 6,078,592 it is referred to the method of Digital Audio Broadcasting (DAB) for decoding and encoding data. A system for wireless serial transmission on encoded  
10 information according to the FSK method is mentioned in US-Patent 6,198,783.

US-Patent 5,737,595 discloses a distributed database system in the form of a Datacast network with a plurality of database receivers. A data stream is encoded into Datacast packets as defined by the World Standard Teletext specification also known as Packet  
15 31 data.

### **SUMMARY OF THE INVENTION**

20 It is an object of the invention to provide an efficient device, a system and a method for recognising and extracting embedded data, which data is embedded in the broadcast information transmitted by a broadcaster.

With the forgoing and other objects in view there is provided, in accordance with the  
25 invention a device for recognising and extracting embedded data, which data is embedded in a broadcast information transmitted by a broadcaster. The device also serves for transmitting the extracted data to a home network. For this the device comprises a content aware adapter for recognising and extracting the embedded data and for transmitting the extracted data to the home network. It further comprises a  
30 connector for providing a communication link between the adapter and a receiver, which receiver receives the broadcasted information.

With the device it is possible not only to receive embedded information, for example control data, advertising or other commercial data, which can be transmitted to a

single consumer device. Instead it is possible by using the home network to receive and retransmit this information to a number of consumer devices like computers, toys, personal digital assistants, mobile phones etc. All these consumer devices can be reached by broadcasting information and transmitting this to just one receiver, like a television receiver. The information can be transmitted in a way so that it is directly related to the content of the broadcast, for example an advertiser advertising his products can provide a consumer device with more detailed information of the product as well as all the forms etc. The advertiser may transmit electronic coupons along with the adverts.

10

The information which is transmitted can be in digital form. However the device may also be used to support visual or audio cues, with which to trigger recording of a radio recording device or any other such storage media. Audio cues could be recognition of particular words such as favourite pop group or news item and visual cues could be network markers, programme title sequences or even facial recognition of a particular film star for instance.

15

In accordance with another feature the content aware adapter operates between a receiver, like a television, and the home network and is connected via a SCART link to the receiver.

20

A SCART (Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs) connector is used for combined audio and video connections. The connector is also known as Pertitel connector or Euroconnector. A formal description is given in the CENELEC EN 50 049-1:1989 standard or in the IEC 933-1 standard. Different pin-configurations exist. Which configurations are available depends on the video device used. Sometimes one can choose the configuration (like composite or S-video) by changing a software setting. Two status signals define (partly) which video signals are active. A video device can use these status signals to automatically switch between internal or external audio/video signals.

30

In accordance with a further feature the device comprises a content aware adapter which is provided as an integrated circuit (IC) and as such is directly connected to the



receiver. The integrated circuit could be directly integrated into the receiver itself, for example a television, or other parts of the receiver.

In accordance with an added feature the home network is a wireless network. By  
5 using a wireless network the number of consumer devices within the network as well as the location of the consumer devices can be easily changed within the range of the wireless network without the need to install further leads, connectors etc within the building. The wireless network may be as ad-hoc radio frequency (RF) network.

10 In accordance with an additional feature the home network is a short range, low power radio frequency network. The home network may be a Bluetooth network or others like HomeRF or based on IEEE802.11..

The Bluetooth wireless technology allows users to make effortless, wireless and  
15 instant connections between various communication devices, such as mobile phones and desktop and notebook computers. Since it uses radio transmission, transfer of both voice and data is in real-time. Bluetooth is a short-range, low-power 1 Mbit/sec wireless network technology in the 2.4 GHz band, suitable for use in ‘piconets’. For instance, it can be used for communications between fridges, microwaves,  
20 telephones, and ‘real’ computers.

The Bluetooth radio is built into a small microchip and operates in a globally available frequency band ensuring communication compatibility world-wide. The Bluetooth specification has two power levels defined; a lower power level that covers  
25 the shorter personal area within a room, and a higher power level that can cover a medium range, such as within a home. Software controls and identity coding built into each microchip ensure that only those units preset by their The Bluetooth wireless technology supports both point-to-point and point-to-multipoint connections. With a certain specification provided in year 2000, up to seven ‘slave’ devices can be set to  
30 communicate with a ‘master’ radio in one device. Several of these ‘piconets’ can be established and linked together in ad hoc ‘scatternets’ to allow communication among continually flexible configurations. All devices in the same piconet have priority synchronisation, but other devices can be set to enter at any time. The topology can best be described as a flexible, multiple piconet structure.



In accordance with yet another feature the home network is a wired network, like HAVi or Home Plug.

- 5 HAVi for example is a digital AV network that provides a home networking software specification for seamless interoperability among home entertainment products. Equally important, the HAVi specification (HAVi V1.0, HAVi Java APIs V1.0, and HAVi Level 2 UI 1.01 Beta) is AV-device-centric, which meets the demands of digital audio and video. It defines an operating-system-neutral middleware that
- 10 manages multi-directional AV streams, event schedules, and registries, while providing APIs for the creation of a new generation of software applications. As interconnection medium IEEE 1394 (i.LINK® or FireWire®) is used.

- In accordance with yet an added feature the adapter is in connection with at least one
- 15 consumer device via the home network. The consumer device can be any device which is capable for operating within a home network, for example laptops, notebooks, personal digital assistants, mobile phones as well as children's toys or others.

- 20 In accordance with yet an additional feature the consumer device is connected with the network operator responsible for broadcasting the information and/or to a broadcaster itself, which is not responsible for but broadcasting the information, via a global network.

- 25 In accordance with a concomitant feature the global network is the internet, a mobile network, for example based on international standards like GSM or UMTS or any other suitable global network. This connection via the consumer device and the global network gives the consumer the possibility to communicate with the network operator. It is therefore possible, for example in case of advertisement, that the
- 30 consumer places an order with the network operator or broadcaster for buying some products. It further gives the consumer the possibility to comment on the information given in the embedded data.

In accordance with again another feature the content of the adapter is capable to recognise data embedded by at least one of the following methods, namely data on teletext, line over scan, data embedded in an audio channel, hidden data in images, explicit digital data embedded into digital transmission standard, hidden data in  
5 images (steganographic techniques) or digital audio broadcast (DAB). These and other methods for encoding data are well known so that the principles of these encoding methods are known by persons skilled in the art. The method of data embedding in audio channel includes frequency shift keying (FSK) or the method of spread-spectrum or echo modulation as for example described in US Patents  
10 4,807,031 and 5,111,417 or 5,912,644 respectively.

With regard to the system, the object is achieved according to the invention by a system for recognising, extracting and transmitting embedded data which comprises a receiver, for receiving broadcasted information, which broadcasted information  
15 includes the embedded data. The system further comprising a device for recognising and extracting the embedded data and transmitting the extracted data and comprising a home network to which the extracted data is transmitted by the device, which home network is connectable to a consumer device for receiving the extracted data.

20 For the system the same advantages and features as for the device apply in particular with respect to a content aware adapter for recognising and extracting the encoded data as mentioned above. The home network maybe a wireless home network using radio frequency (RF) or based on the standard of IEEE 8002.11 or maybe a wired system such as HAVi or a mains borne system such as HomePlug. The transmitted  
25 data may include encoded data, encoded by any of the following methods as data on teletext (Datacast), line over scan, data embedded in an audio channel, such as FSK or spread-spectrum or echo modulation; hidden data images also known as steganographic techniques, explicit digital data embedded into digital transmission standards, digital audio broadcast (DAB), in particular if the device includes a digital  
30 radio rather than a television, word recognition and facial and image matching.

In accordance with again an added feature the consumer device is connected to the home network and further to a network operator, which network operator is responsible for broadcasting that broadcasted information, and/or to a broadcaster

broadcasting the information. This gives network operators and/or broadcasters on the one side and consumers on the other side the opportunity to communicate with one another. The broadcaster broadcasts a general information with additional information for the consumer embedded therein. The information is broadcasted and  
5 received by a receiver for example a television, then extracted from the television by content aware adapter which permanently monitors the broadcast for recognisable data and retransmits the recognised and decoded information to a home network, in particular a wireless network, and from there to a consumer device.

10 In accordance with again an added feature the consumer device is connected to the broadcaster or the network operator, which enables the consumer to react or comment on the embedded consumer information. The system preferably comprises a processor to recognise, decode and retransmit the embedded data into the network. A connection from the consumer device to the broadcaster and/or network operator is  
15 preferably established via a global network, which may include the internet or any suitable mobile network, like GSM or UMTS.

With regard to the method the object is achieved according to the invention by a method for transmitting data to the consumer device comprising the steps of  
20 monitoring and broadcasted information which includes embedded data, recognising and extracting that embedded data, transmitting the extracted data to a home network and transmitting the data from the home network to a customer device.

In accordance with still a further feature the step of recognising and extracting the  
25 embedded data includes the recognition of data embedded by any one of the following methods like data on teletext, line over scan, data embedded in an audio channel, hidden data in images, explicit digital data embedded digital transmission standards or DAB.

30 In accordance with still an added feature the method further comprises after the step of receiving the data the additional step, that the consumer device sends consumer information to a network operator responsible for broadcasting the data. This step enables the consumer to get in contact with the broadcaster or somebody who is responsible for the broadcasted information like a company advertising its products

and to take appropriate actions with respect to the content of the transmitted consumer related information. For example a consumer may give some consumer information or orders to a network operator.

- 5 In accordance with still an additional feature the consumer information is transmitted via a global network to the network operator or to the broadcaster broadcasting the information.

10 Although the invention is illustrated and described herein as embodied in a device, a system and a method for recognising and extracting embedded data and transmitting the extract data to a home network it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of the equivalents of the claims.

15

The device, system and method of the invention, however, together with additional objects and advantages thereof will best understood from the following description of specific embodiments when read in conjunction with the accompanying drawings.

## 20 BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1 and 2 are a schematical diagram of a system for recognising data embedded in broadcast information.

## 25 DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the figures of the drawing, components corresponding to one another of a respectively shown exemplary embodiments in each case have the same reference numeral. The drawing is simplified in order to emphasise certain features. The  
30 information which can be gathered directly from the drawing can be supplemented for the practical construction within the limits of the knowledge and the capability of the person skilled and active in the relevant art with due regard to the explanations preceding this information.

Referring now to the figures of the drawings in detail and first particularly to Figure 1 thereof, there is shown a device 1 for recognising and extracting embedded data, which data is embedded in a broadcast information. The broadcasted information is broadcasted by a broadcaster 7 via a sender 8, which is either a satellite or an earth bound station. The information is broadcasted as radio frequency signal. The broadcasted information includes embedded data, which is embedded by any appropriate method as discussed above. The broadcast information is received by a receiver 6, in particular a television receiver. The receiver 6 is connected via a connector 3 to a content aware adapter 2. The content aware adapter 2 monitors the broadcast for recognisable data. The content aware adapter 2 is also connected to a home network 4. After recognising and decoding the embedded data the content aware adapter 2 retransmits this information to the home network 4. To the home network 4 a number of consumer devices 5 is linked. So the content aware adapter 2 retransmits the decoded information via the home network 4 to the consumer devices 5. The home network 4 is preferably a radio frequency and wireless network, for example a Bluetooth network. By way of example as consumer devices 5 there are shown a personal digital assistant and a notebook. The consumer devices 5 are connected over a global network 9, for example the internet, a mobile network like GSM or UMTS to the broadcaster 7. According to Figure 2 the consumer devices 5 are connected via the global network 9 to a network operator 10, in particular a mobile network operator. This network operator 10 is connected to the broadcaster 7.

In Figure 1 a system for transmitting data to consumer devices 5 in a home network 4 is shown, whereby the consumer devices 5 may also get into contact with the broadcaster 7 for example by establishing a point to point connection. So there is a direct connection between the consumer device 5 and the broadcaster 7 established only in a single direction from the consumer device 5 to the broadcaster 7. The broadcaster 7 itself transmits information via the sender 8 and the television 7 by using encoded data to the consumer devices 5 in the home network 4 only. According to Figure 2 the consumer devices 5 do not communicate directly with the broadcaster 7 but with a network operator 10. The network operator 10 communicates with the broadcaster 7 as well as with the consumer devices 5, in particular over a point to point connection. In this case a bi-directional communication link of the same type between consumer devices 5 and network operator 10 is established

## Claims

1. Device (1) for recognising and extracting embedded data, which data is embedded  
5 in a broadcasted information transmitted by a broadcaster (7), and for transmitting  
said extracted data to a home network (4), comprising  
a content aware adapter (2) for recognising and extracting said embedded data and for  
transmitting said extracted data to a home network (4) and  
a connector (3) for providing a communication link between said adapter and a  
10 receiver (6), which receiver (6) receives said broadcasted information.
2. Device (1) according to claim 1 wherein said connector (3) comprises a SCART  
link for establishing an audio and/or video connection to said receiver (6).
- 15 3. Device (1) according to claim 1 wherein said adapter (2) is provided as an  
integrated circuit (IC) and as such directly connected to said receiver (6).
4. Device (1) according to any of the preceding claims wherein said home network (4)  
is a wireless network.  
20
5. Device (1) according to claim 4 wherein said home network (4) is a short-range,  
low-power radio frequency transmission network, for example a Bluetooth network.
6. Device (1) according to any of the claims 1 to 3 wherein said home network (4) is a  
25 wired network, like HAVi or Home Plug.
7. Device (1) according to any of the preceding claims wherein said adapter (2) is in  
connection with at least one consumer device (5) within the home network (4).
- 30 8. Device (1) according to claim 7 wherein said consumer device (5) is connected  
with a network operator (10) responsible for broadcasting said information and/or said  
broadcaster (7) via a global network (9).
9. Device (1) according to claim 8 wherein said global network (9), is the internet or a



mobile network based on an international standard like GSM or UMTS.

10. Device (1) according to any of the preceding claims wherein said adapter (2) is capable to recognise data embedded by at least one of the following methods:

5 Data on teletext; line over scan, data embedded in an audio channel, hidden data in images, explicit digital data embedded into digital transmission standards or DAB.

11. System for recognising, extracting and transmitting embedded data comprising:

- a receiver (6), for receiving broadcasted information, which broadcasted information  
10 includes said embedded data

- a device (1), for recognising and extracting said embedded data and transmitting said extracted data,

- a home network (4) to which said extracted data is transmitted by said device (1), which home network (4) is connectable to a consumer device (5) for receiving said  
15 extracted data.

12. System according to claim 11, wherein said consumer device (5) is connected to said home network (4) and additionally to a network operator, which network operator (10) is responsible for broadcasting said broadcasted information, and/or to a  
20 broadcaster (7) broadcasting said information.

13. System according to claim 11 or 12, wherein said consumer device (5) is connected via a global network (9), like internet or a mobile network to said network operator (10) and/or said broadcaster (7).  
25

14. Method for transmitting data to a consumer device (5) comprising the steps:

- monitoring a broadcasted information, with includes embedded data,  
- recognising and extracting said embedded data,  
- transmitting said extracted data to a home network (4) and  
30 - transmitting said data from the home network (4) to said consumer device (5).

15. Method according to claim 14 wherein said data is embedded by using at least one of the following methods:

Data on teletext; line over scan, data embedded in an audio channel, hidden data in

images, explicit digital data embedded into digital transmission standards or DAB.

16. Method according to claim 14 or 15 wherein after receiving said data said  
consumer device (5) sends consumer information to a network operator (10)  
5 responsible for broadcasting said data.

17. Method according to claim 16 wherein said consumer information is transmitted  
via a global network (9) to said network operator (10).

10

	1	device
	2	adapter
	3	connector
	4	home network
5	5	consumer device
	6	receiver
	7	broadcaster
	8	sender
	9	global network
10	10	network operator



INVESTOR IN PEOPLE

Application No: GB 0112732.3  
Claims searched: 1-17

Examiner: John Betts  
Date of search: 28 December 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): H4L (LDGR, LDGX, LDPPX, LDDDX, LESF) H4F (FHT)  
G4F (F14)

Int Cl (Ed.7): H04L 12/28 H04Q 7/22 11/04 7/32 H04M3/487 H04N7/08

G08C 23/02 23/04, 23/06, 17/02

Other: On-line: WPI, EPODOC, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	US6037932	(Microsoft) example of embedding data in TV signal.	1,11,14 at least
Y	US6018768	(ACTV) example of embedding data in TV signal.	1,11,14 at least
Y	US5715261	(I & T Com) example of home network	1,11,14 at least
Y	US4807031	(Interactive Systems) example of embedding data in TV signal.	1,11,14 at least
Y	WO99/00979 A1	(Microsoft) example of embedding data in TV signal.	1,11,14 at least
Y	WO98/17073 A1	(Thomson Consumer) example of home network	1,11,14 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.